

NSF RELEASES STATISTICS ON R&D EXPENDITURES IN FY 2008 BY FEDERALLY FUNDED R&D CENTERS

by Mark Boroush¹

Latest survey figures from the National Science Foundation (NSF) show that research and development expenditures by all federally funded R&D centers (FFRDCs) totaled \$14.7 billion (current dollars) in FY 2008 (table 1). This represented about 35% of all federal R&D performance and 4% of all U.S. R&D that year.²

FFRDCs are privately operated R&D organizations but are exclusively or substantially financed by the federal government.³ FFRDCs provide the sponsoring federal agencies with capabilities to meet special long-term R&D needs that cannot be met as effectively by existing in-house or contractor resources. FFRDC activities presently span various roles: analyzing, integrating, supporting (nonfinancial), and/or managing, in addition to performing R&D.

FFRDC organization ranges from traditional contractor-owned/contractor-operated or government-owned/contractor-operated structures to various degrees of contractor/government control and ownership. Each FFRDC is operated, managed, and/or administered by a university or university consortium, a nonprofit organization, or an industrial firm, either as an autonomous organization or as a separate operating unit.⁴

FFRDCs were created after the end of World War II, in a restructuring of earlier partnerships of academic scientists and the U.S. government (through ad hoc

laboratories and research groups) to meet unique R&D needs of the war effort (which resulted in advanced radar and sonar technologies and the atomic bomb, among other developments). These prior relationships were transformed into federal research centers to retain academic scientists in the domestic efforts to advance nationally critical technologies. By the mid-1960s, these federal R&D facilities were termed “federally funded R&D centers.” The FFRDCs continue today as significant components in the U.S. national and federal infrastructure for R&D; they perform R&D for both defense and civilian applications and across a broad range of science and engineering fields.

Master List of FFRDCs

In adherence to federal statute, NSF's Division of Science Resources Statistics maintains a master list of FFRDCs with current information on sponsoring federal agency, type of administrator, geographic location, and type of activity.^{5, 6} At the close of federal FY 2008, there were 38 FFRDCs located across 18 U.S. states, the District of Columbia, and Puerto Rico (table 1).

The current FFRDC roster encompasses R&D laboratories, study and analysis centers, and systems engineering centers. Sixteen of the 38 current FFRDCs are sponsored by the Department of Energy (DOE). The Department of Defense sponsors 10; NSF, 5; and the Department of Homeland Security (DHS), 2. The National



TABLE 1. R&D expenditures at federally funded research and development centers, by institution: FY 2008
(Dollars in thousands)

Institution	Sponsoring agency/agencies	Location	R&D expenditures		
			Total	Federally financed	All other funding ^a
All FFRDCs	-	-	14,707,088	14,262,947	444,141
University-administered FFRDCs	-	-	4,701,645	4,550,332	151,313
Ames Laboratory	DOE	Ames, IA	27,306	27,306	0
Argonne National Laboratory	DOE	Argonne, IL	533,530	487,641	45,889
AUI National Radio Astronomy Observatory	NSF	Green Bank, WV	146,098	145,953	145
Fermi National Accelerator Laboratory	DOE	Batavia, IL	340,486	336,123	4,363
Jet Propulsion Laboratory	NASA	Pasadena, CA	1,733,597	1,733,597	0
Lawrence Berkeley National Laboratory	DOE	Berkeley, CA	573,917	519,756	54,161
MA Institute of Technology Lincoln Laboratory	DOD, Air Force	Lexington, MA	641,386	637,879	3,507
National Astronomy and Ionosphere Center	NSF	Arecibo, PR	12,586	12,418	168
National Center for Atmospheric Research	NSF	Boulder, CO	161,130	139,667	21,463
National Optical Astronomy Observatory	NSF	Tucson, AZ	55,922	50,165	5,757
Plasma Physics Laboratory	DOE	Princeton, NJ	78,154	78,039	115
Software Engineering Institute	DOD, Office of the Secretary	Pittsburgh, PA	80,963	66,721	14,242
Stanford Linear Accelerator Center	DOE	Stanford, CA	234,316	234,316	0
Thomas Jefferson National Accelerator Facility	DOE	Newport News, VA	82,254	80,751	1,503
Nonprofit-administered FFRDCs	-	-	3,689,108	3,536,795	152,313
Aerospace Corporation	DOD, Air Force	El Segundo, CA	38,940	16,349	22,591
Arroyo Center	DOD, Army	Santa Monica, CA	23,852	23,852	0
Brookhaven National Laboratory	DOE	Upton, NY	480,455	459,348	21,107
C3I Federally Funded R&D Center	DOD, Office of the Secretary	Bedford, MA/McLean, VA	52,053	52,053	0
Center for Advanced Aviation System Development	FAA	McLean, VA	7,470	7,470	0
Center for Naval Analyses	DOD, Navy	Alexandria, VA	106,967	94,552	12,415
Center for Nuclear Waste Regulatory Analyses	NRC	San Antonio, TX	17,960	17,169	791
Homeland Security Institute	DHS	Arlington, VA	27,400	27,400	0
Institute for Defense Analyses Communication and Computing	DOD, NSA	Alexandria, VA	59,500	59,500	0
Institute for Defense Analyses Studies and Analyses	DOD, Office of the Secretary	Alexandria, VA	146,500	146,500	0
Internal Revenue Service FFRDC	IRS	McLean, VA	9,679	9,679	0
National Biodefense Analysis and Countermeasures Center	DHS	Frederick, MD	12,979	12,979	0
National Defense Research Institute	DOD, Office of the Secretary	Santa Monica, CA	40,051	40,051	0
National Renewable Energy Research Laboratory	DOE	Golden, CO	229,399	219,296	10,103
Oak Ridge National Laboratory	DOE	Oak Ridge, TN	1,251,336	1,205,784	45,552
Pacific Northwest National Laboratory	DOE	Richland, WA	1,136,773	1,097,019	39,754
Project Air Force	DOD, Air Force	Santa Monica, CA	41,794	41,794	0
Science and Technology Policy Institute, The	NSF	Washington, DC	6,000	6,000	0
Industry-administered FFRDCs	-	-	6,316,335	6,175,820	140,515
Idaho National Laboratory	DOE	Idaho Falls, ID	236,037	224,273	11,764
Lawrence Livermore National Laboratory ^b	DOE	Livermore, CA	1,301,874	1,248,594	53,280
Los Alamos National Laboratory	DOE	Los Alamos, NM	2,073,538	2,051,550	21,988
NCI-Frederick Cancer R&D Center	NIH	Frederick, MD	509,700	509,700	0
Sandia National Laboratories	DOE	Albuquerque, NM	2,076,786	2,023,303	53,483
Savannah River Technology Center	DOE	Aiken, SC	118,400	118,400	0

DHS = Department of Homeland Security; DOD = Department of Defense; DOE = Department of Energy; FAA = Federal Aviation Administration; FFRDC = federally funded research and development center; IRS = Internal Revenue Service; NASA = National Aeronautics and Space Administration; NCI-Frederick = National Cancer Institute at Frederick; NIH = National Institutes of Health; NRC = Nuclear Regulatory Commission; NSA = National Security Agency; NSF = National Science Foundation.

^aIncludes funding from state and local government, industry, institutional (own) funds, and any other nonfederal sources.

^bLawrence Livermore National Laboratory became industry-administered in October 2007. Previously, it was university-administered.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at FFRDCs, FY 2008.

Institutes of Health (NIH), National Aeronautics and Space Administration, Nuclear Regulatory Commission, Federal Aviation Administration, and Internal Revenue Service each sponsor one FFRDC.

Fourteen of the FFRDCs are currently administered by universities or university consortiums; 18 are administered by nonprofit organizations; and 6 are administered by industrial organizations. (FFRDCs may have a mix of administrators; classifications reported here reflect the lead administrator.) This distribution among administrative categories has been fairly stable over time. But in the last several years, two of DOE's largest FFRDCs—Los Alamos National Laboratory and Lawrence Livermore National Laboratory—shifted from university-administered to industry-administered. The two most recently created FFRDCs (both established in March 2009) are sponsored by DHS.

R&D Expenditures and Funding

The \$14.7 billion of total R&D expenditures by FFRDCs in FY 2008 represented an increase of more than 6% over the previous year (table 2). Total FFRDC R&D expenditures have generally increased over the last 5 years: growth in funding averaged 3.9% annually over the FY 2003–08 period, outpacing the general rate of inflation in the economy, which averaged 2.9% annually over the same period. The slight decline in FY 2006—which is somewhat larger when adjusted for inflation—was an exception over this recent period. (A more varied set of trends is apparent when subtotals for the various types of administration are distinguished. But these patterns are complicated by the earlier mentioned shifts of the two DOE national laboratories, in 2006 and 2007, from university-administered to industry-administered.)

TABLE 2. Total and federally financed R&D expenditures at federally funded research and development centers, by type of FFRDC: FY 2003–08

Type of FFRDC	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Dollars (thousands)						
Total R&D, all FFRDCs	12,126,881	12,716,055	13,249,816	13,212,313	13,827,087	14,707,088
University-administered	7,200,056	7,578,865	7,821,054	7,783,953	5,855,193	4,701,645
Nonprofit-administered	2,463,386	2,586,394	2,816,988	2,859,751	3,191,308	3,689,108
Industry-administered	2,463,439	2,550,796	2,611,774	2,568,609	4,780,586	6,316,335
Federally financed R&D, all FFRDCs	11,681,288	12,362,279	12,892,042	12,824,552	13,403,181	14,262,947
University-administered	6,948,179	7,424,037	7,660,415	7,600,335	5,654,952	4,550,332
Nonprofit-administered	2,327,524	2,447,507	2,687,276	2,729,011	3,054,830	3,536,795
Industry-administered	2,405,585	2,490,735	2,544,351	2,495,206	4,693,399	6,175,820
Share of total R&D all FFRDCs (percent)						
Federally financed R&D, all FFRDCs	96.3	97.2	97.3	97.1	96.9	97.0
Percent change over previous year						
Total R&D, all FFRDCs	-	4.9	4.2	-0.3	4.7	6.4
GDP price deflator	-	2.9	3.3	3.2	2.7	2.2

FFRDC = federally funded research and development center; GDP = gross domestic product.

NOTES: Los Alamos National Laboratory (approximately \$2 billion in annual R&D expenditures in recent years) became industry-administered in June 2006; previously, it was university-administered. Lawrence Livermore National Laboratory (more than \$1 billion in annual R&D expenditures in recent years) became industry-administered in October 2007; previously, it was university-administered. These changes are reflected in the distribution of R&D expenditures for FY 2007–08.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at FFRDCs, FY 2008.

Federal government funding accounted for 97% (\$14.3 billion) of the FY 2008 FFRDC expenditure total (table 2). The small remainder (some \$0.4 billion) came from a mix of other sources, including state and local government, industry, and the FFRDCs' own funds. This predominant federal role in the funding of FFRDC R&D has varied only slightly over the last 5 years; furthermore, it differs only marginally when the expenditure totals are disaggregated to distinguish the administration by universities, nonprofit organizations, and industrial firms.

Data from NSF's Survey of Research and Development Expenditures at FFRDCs indicate that in FY 2008 basic research activities accounted for 37% of total FFRDC R&D expenditures; applied research, 27%; and development, 36% (table 3). When the expenditure totals are distinguished by type of administrator, the shares for basic research remain similar, ranging from 35% to 39%. For applied research and development, the shares range more widely among the three types of administrators.

Data Source and Availability

The statistics on FFRDC R&D presented in this report come from NSF's Survey of Research and Development Expenditures at FFRDCs. This survey—directed at FFRDC administrators—is conducted annually (in conjunction with NSF's Survey of Research and De-

velopment Expenditures at Universities and Colleges). The survey collects data from the FFRDCs on R&D expenditures by source of funds (federal, state and local, industry, institutional, or other) and by character of work (basic research, applied research, or development). Since FY 2001 this survey has been a census of the full population of FFRDCs.

A full set of detailed statistical tables associated with the FY 2008 FFRDC survey is available in the report *FFRDC Research and Development Expenditures: Fiscal Year 2008*.⁷

Update on Other NSF Activities to Survey FFRDCs

Many FFRDCs employ postdocs as part of their efforts to assist government agencies with scientific research and analysis and to train the country's researchers and scientists. In 2008 NSF, partnering with DOE and NIH, began gathering data for a survey about postdoctoral researchers (postdocs) working in FFRDCs. For 2009, the survey is collecting data on the total number of postdocs categorized by sex, race/ethnicity, citizenship, source of support (federal or non-federal), and selected fields of research. These data are contributing to NSF's development of a comprehensive picture of the training of the nation's postdocs in science, engineering, and health-related fields.

TABLE 3. R&D expenditures at federally funded research and development centers, by character of work and type of FFRDC: FY 2008

Type of FFRDC	All R&D expenditures	Basic research	Applied research	Development
Dollars (thousands)				
All FFRDCs	14,707,088	5,437,881	4,026,311	5,242,896
University-administered	4,701,645	1,628,296	710,837	2,362,512
Nonprofit-administered	3,689,108	1,427,614	1,323,859	937,635
Industry-administered	6,316,335	2,381,971	1,991,615	1,942,749
Percent distribution				
All FFRDCs	100.0	37.0	27.4	35.6
University-administered	100.0	34.6	15.1	50.2
Nonprofit-administered	100.0	38.7	35.9	25.4
Industry-administered	100.0	37.7	31.5	30.8

FFRDC = federally funded research and development center.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at FFRDCs, FY 2008.

Notes

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2. These comparisons are based on the 2008 edition of NSF's *National Patterns of R&D Resources*. (See <http://www.nsf.gov/statistics/infbrief/nsf10312/>.) Federal R&D performance is the sum of R&D activities of federal agency intramural research laboratories, agency planning and administration of intramural and extramural R&D, and FFRDC R&D.

3. For a description of the federal guidelines and definitions governing FFRDCs, see the "General Notes" section at <http://www.nsf.gov/statistics/ffrdclist/gennotes.cfm/>.

4. Each FFRDC is legally structured as a not-for-profit limited liability company (LLC).

5. General Services Administration, Department of Defense, National Aeronautics and Space Administration. Federal Acquisition Regulation, Part 35, Section 35.017-6. (Office of Management and Budget, 2005). Available at <https://www.acquisition.gov/FAR/>.

6. The NSF FFRDCs Master Government List is accessible at <http://www.nsf.gov/statistics/ffrdc/>.

7. National Science Foundation, Division of Science Resources Statistics (NSF/SRS). 2010. *FFRDC Research and Development Expenditures: Fiscal Year 2008*. Detailed Statistical Tables NSF 10-310. Arlington, VA. Available at <http://www.nsf.gov/statistics/nsf10310/>.

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